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Textural characteristics of different *mélange* types and rheological implications: a geological point of view.

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The term *bimrocks* (Medley, 2008) indicates complex mixtures of strong blocks of rocks embedded in a softer matrix (i.e., the block-in-matrix fabric), where the mechanical contrast between the two is significant and the volume and size of the blocks influence the rock mass properties at the scale of engineering interest. These chaotic mixtures are created by several modes of genesis in different geological-geodynamic environments and known by geologists by several different names including the term *mélange*.

Years of working on a large number of *mélanges* around the word, collected and discussed in recent reviews (Festa et al. 2010), show that different processes (i.e., tectonic, sedimentary, and diapiric) and their mutual interplay and superposition, contribute in forming different *mélange* types characterized by a different internal fabric, blocks arrangements and textural characteristic at the meso- and micro-scale (Festa et al. 2019).

This internal fabric ranges from structurally ordered block-in matrix-fabric (Bettelli and Vannucchi, 2003, Festa, 2010) strongly anisotropic, typical of a tectonic *mélange*, to highly disordered arrangement of the block-in-matrix fabric resulting in broadly isotropic structures, typical of a sedimentary *mélange* (Festa et al. 2010; 2019). This fabric contrast involves a strongly different rheological behaviors bringing significant implications also for geotechnical engineering purposes. Further complexity derives when the initial fabric of *mélanges* is reworked and overprinted by tectonic processes, as commonly occurred in the geological record, or the original mechanical contrast in competence between blocks and matrix evolves in response to change in physical condition (e.g., lithification processes, change in temperature, dewatering; etc. Fagereng et al. 2018)

Studies and detailed observations on *mélanges*, up to the microscale, could help in better understanding and distinguish different types of “*bimrocks*” encountered in geotechnical engineering projects. Therefore, a close collaboration between geologists with expertise in *mélanges* and engineers is desirable to improve our knowledge and understanding on “*bimrocks*” in order to systematically characterize their properties for engineering purposes.

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